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Nebraska Wind and Solar Conference, Nov. 13, 2017





Today's presentation: State of the U.S. wind industry

Topics:

- A word on tax reform
- Wind industry nationally
- Wind power in Nebraska
- Q&A



GOP's 'Cruel and Unusual' Tax Plan Cuts Wind Forecast in Half

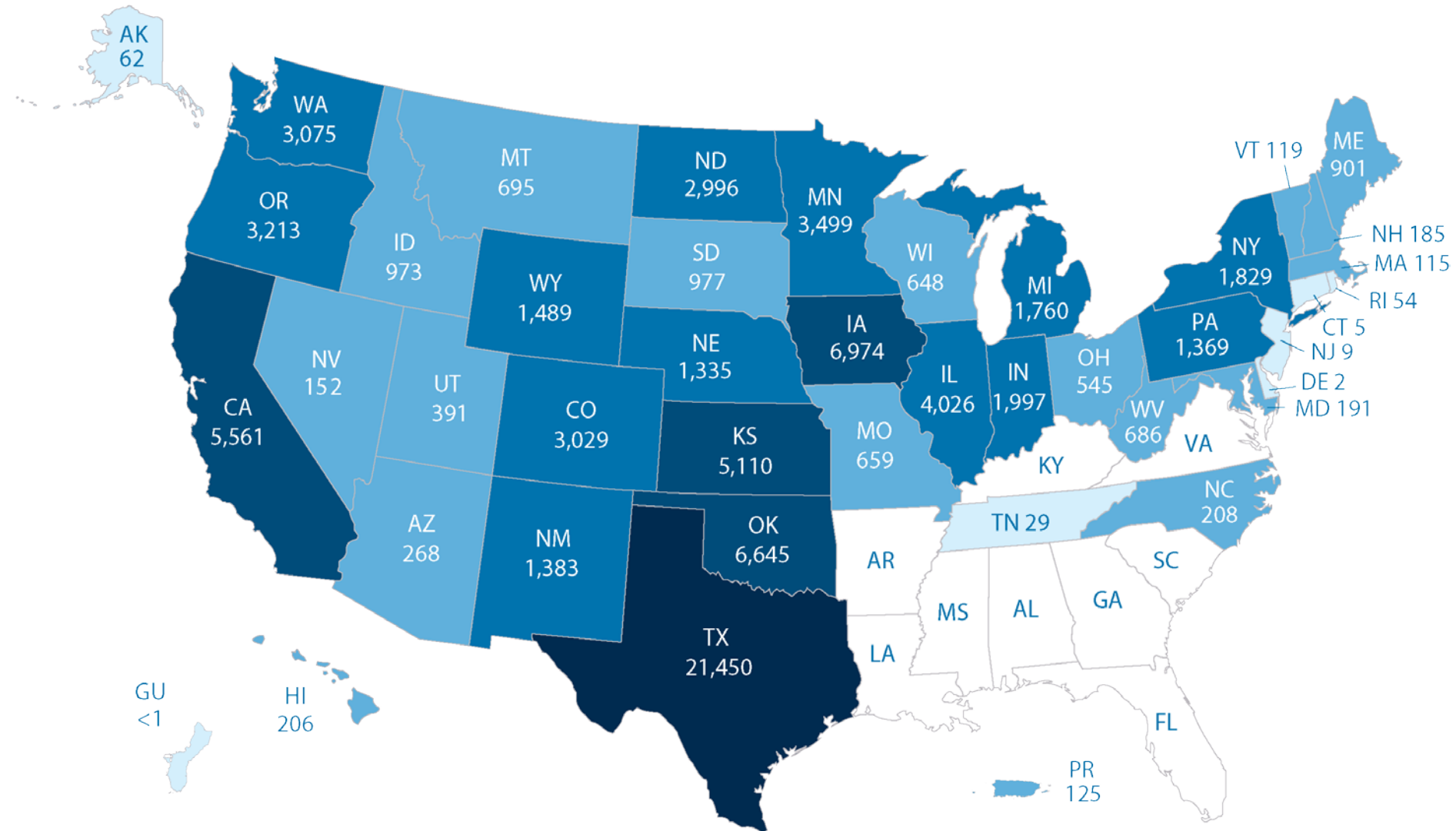
By **Brian Eckhouse**

November 3, 2017, 5:12 PM EDT *Updated on* November 4, 2017, 12:01 AM EDT

From **Climate Changed**

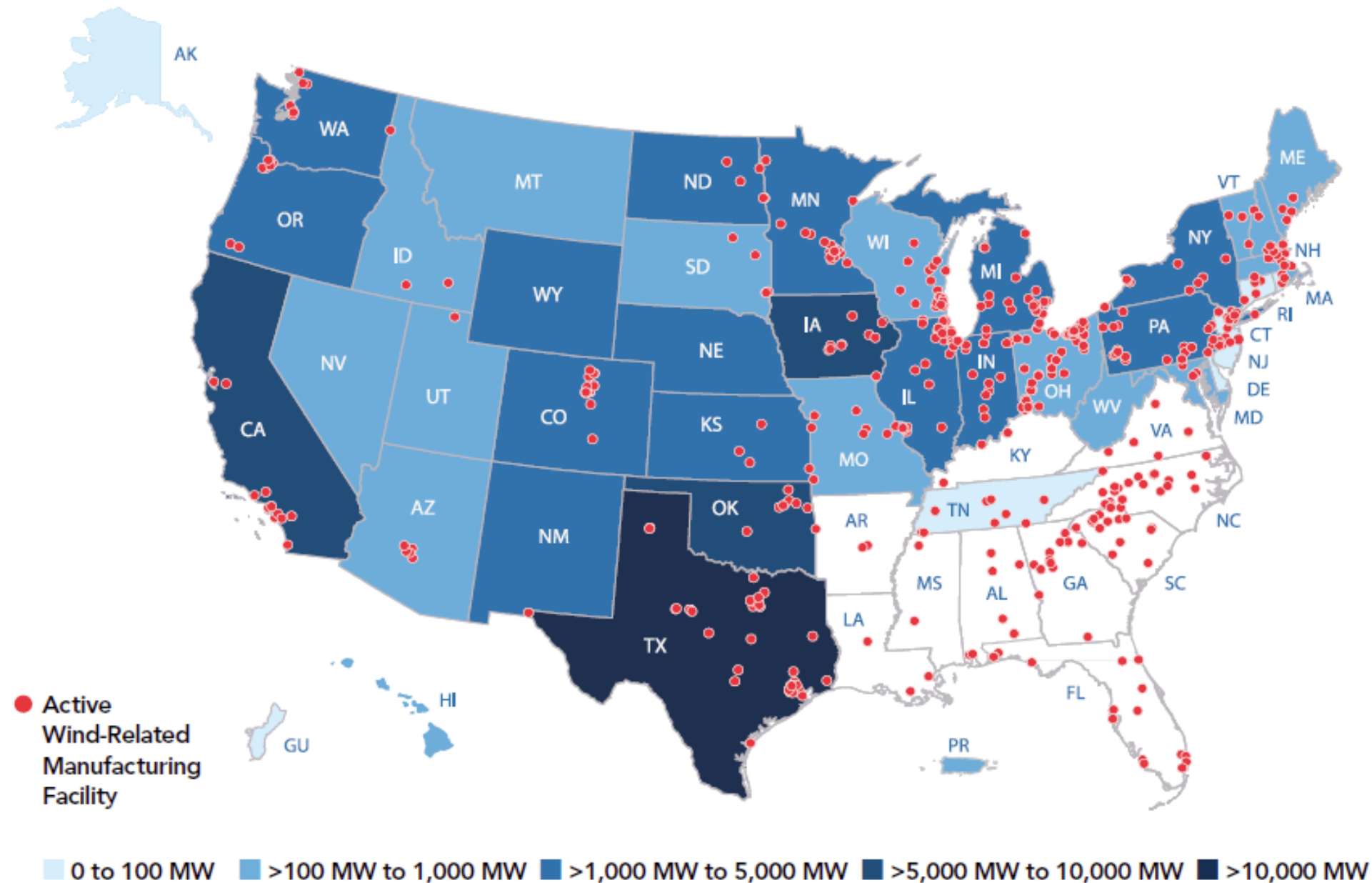
-
- Wind industry would add 19 gigawatts under plan, BNEF says
 - Republican Senator Grassley supports wind tax credit
-

84,944 MW of U.S. wind power capacity in 41 states



0 to 100 MW
 >100 MW to 1,000 MW
 >1,000 MW to 5,000 MW
 >5,000 MW to 10,000 MW
 >10,000 MW

Wind farms and factories benefit all 50 states



With stable policy, wind will generate \$85 billion in economic activity through 2020

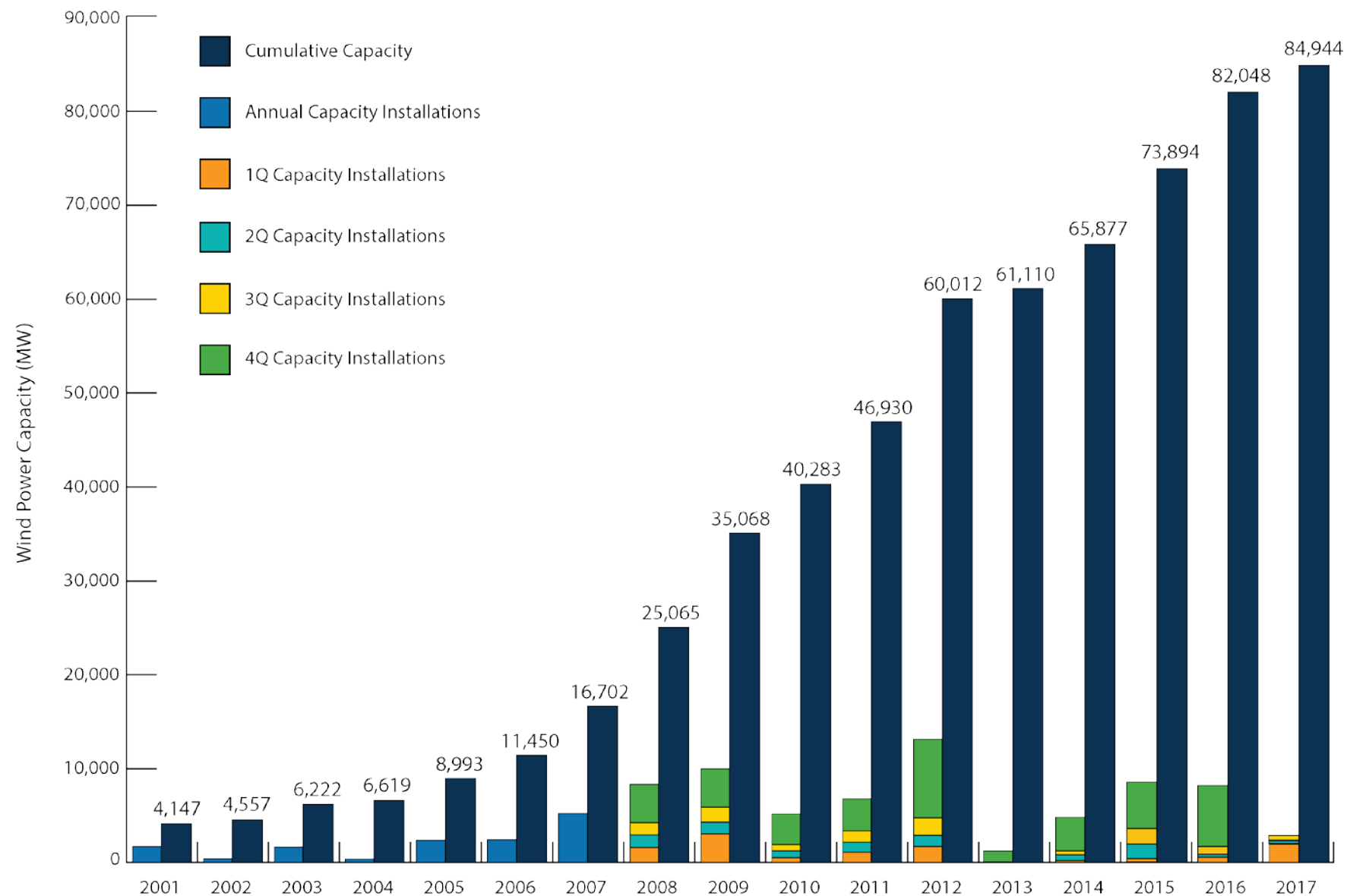






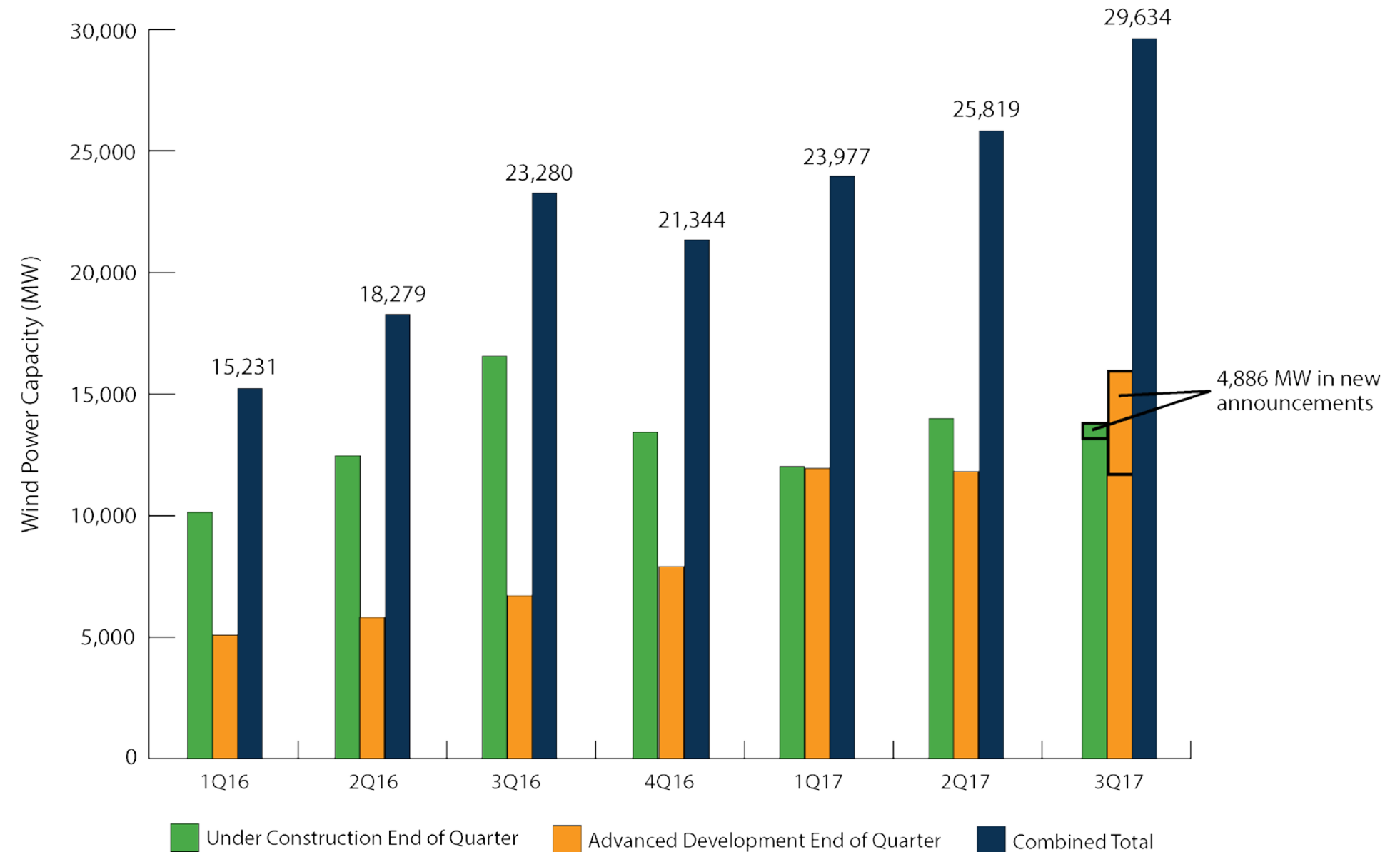
U.S. annual and cumulative wind power capacity growth

- Nearly 85 GW of total installed wind power capacity

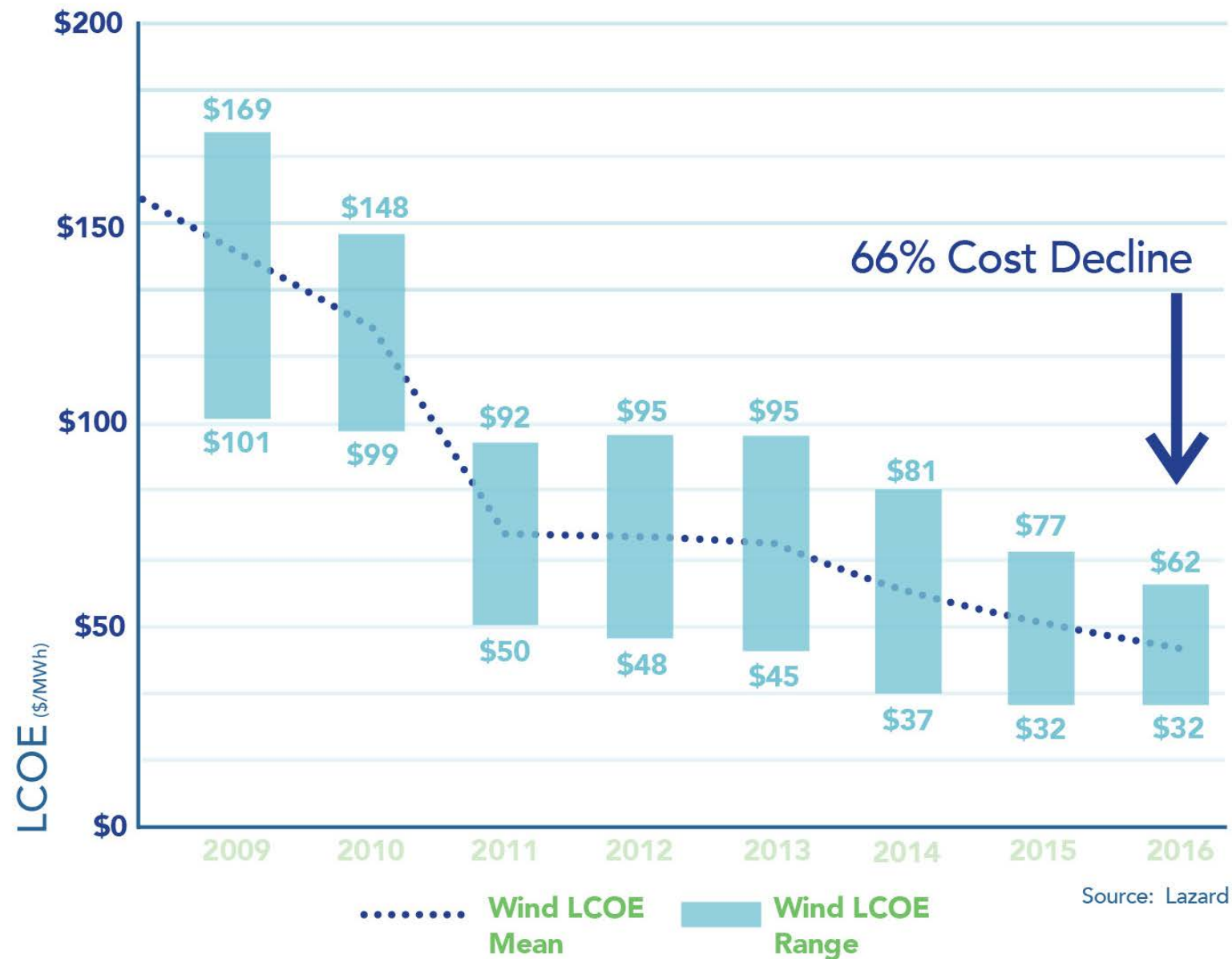


Nearly 30 GW under construction or in advanced development

- 27% year-over-year increase in combined activity
- Activity spread across 149 projects in 32 states
- 4,886 MW of new announcements in 3Q



Wind energy is on sale in America: 66% off



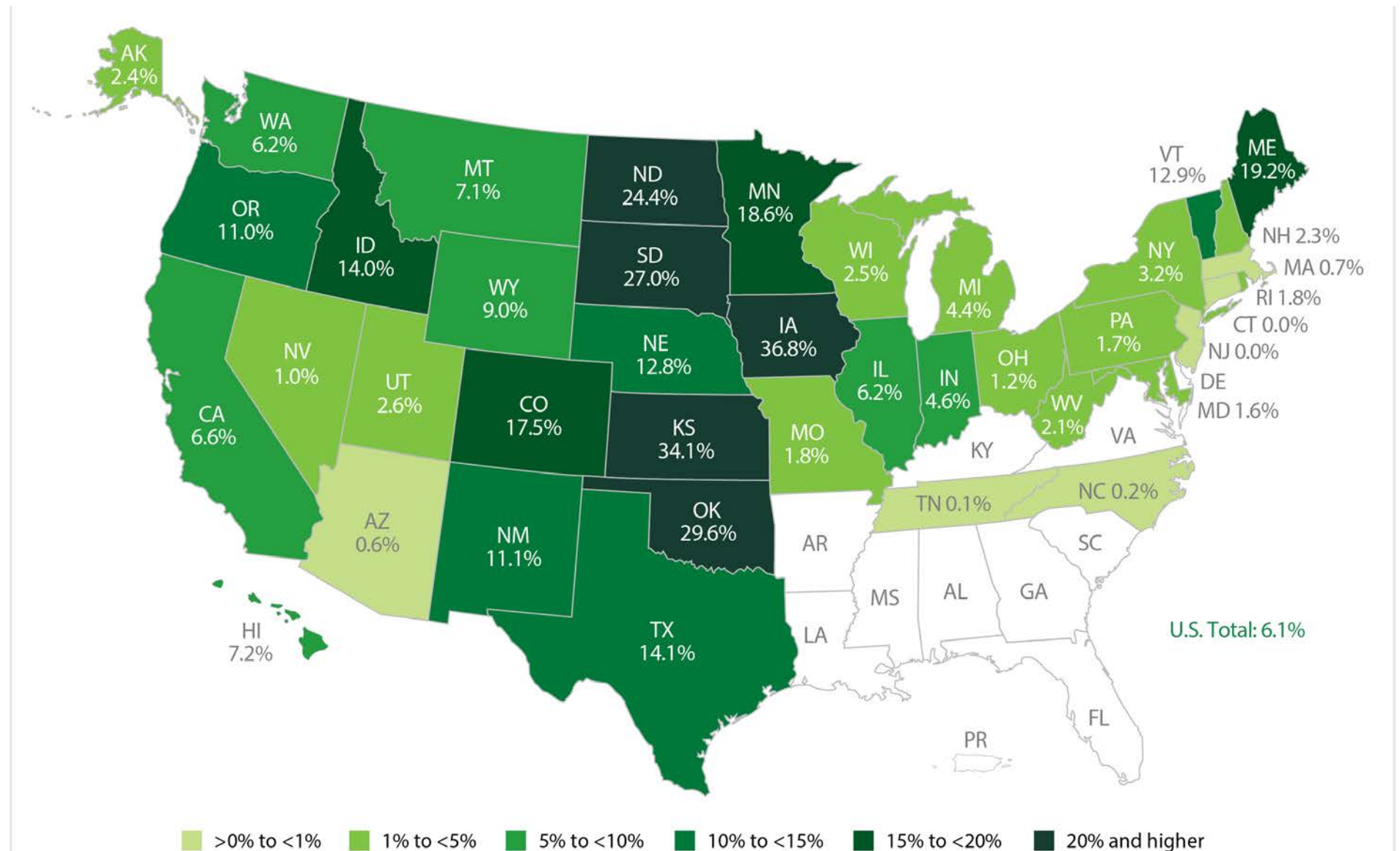


Reasons for falling wind costs include

- Economies of scale (turbines, blades, companies)
- Technology accessing higher winds
- Optimized siting
- Predictive O&M

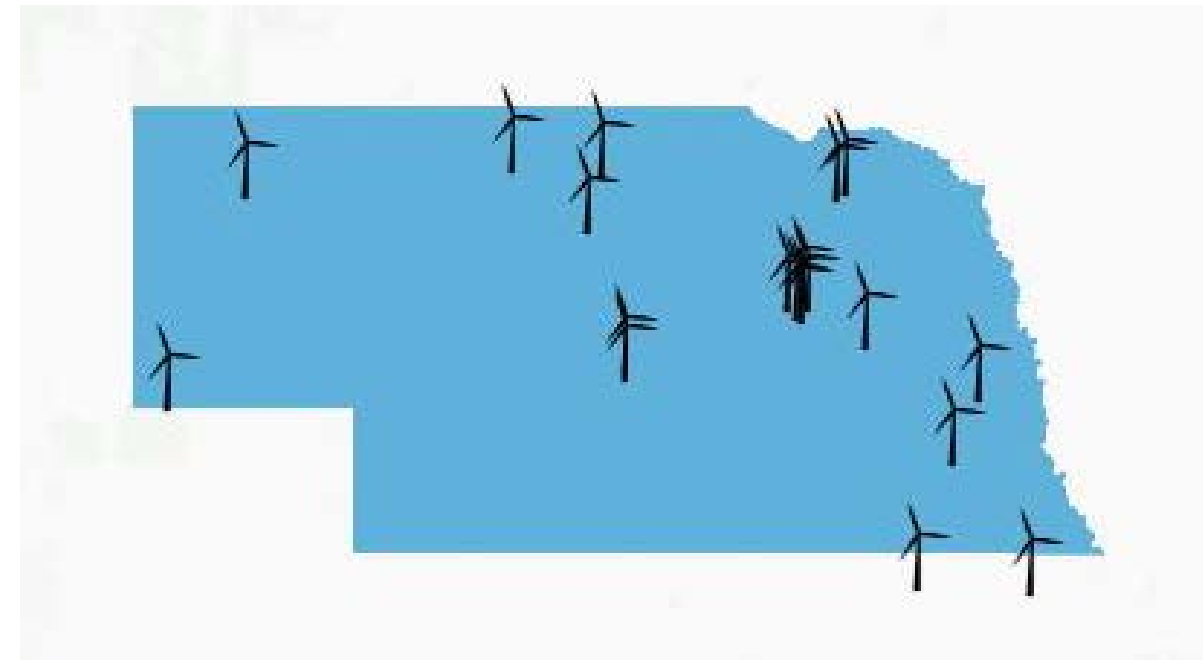
Wind power is increasing on the grid, *reliably* integrated

- The SPP power grid in 14 states now peaks at over 50% wind
- Wind generates nearly 40% of Iowa's electricity year-round
- 14 states produce over 10% of in-state electricity from wind
- Polar Vortex, TX Cold Snap, Hurricane Harvey...
- On track for 10% by 2020



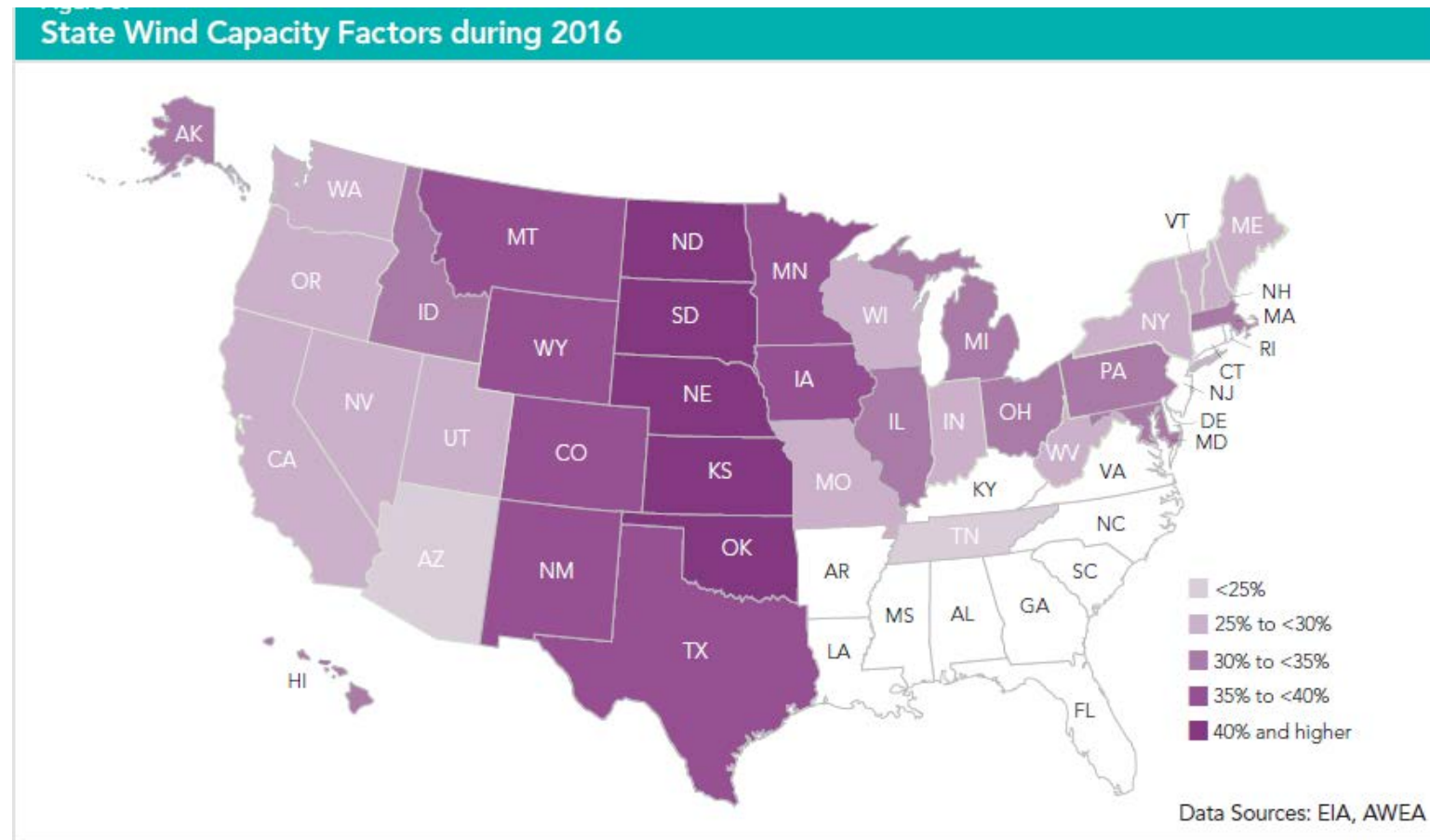
Wind power in Nebraska

- 1,335 MW of wind capacity across 22 projects
- 830 MW under construction or in advanced development
 - 265 MW under construction
 - 566 MW in advanced development



- Wind supplies ~13% of state's electricity generation

Nebraska's wind power potential



- Some of the best wind resources in the country
 - Technical potential of 880,000 MW
- Home to the most productive wind turbines in the country in 2016
 - 45% average capacity factor

Wind works for Nebraska

Economic benefits

- 3,000 - 4,000 jobs in 2016
- \$2.4 billion in total investment
- Local farmers and ranchers receive \$1-5 million annually in land lease payments



Grand Prairie Wind Farm, Holt County

Utility wind energy purchasers in Nebraska

Nebraska utilities are buying wind power

- Home to three of the top 10 public utilities with wind energy

Top 10 Public Utilities and Public Utility Districts with Wind Capacity on System		
Ranking	Utility	Capacity (MW)
1	Tennessee Valley Authority	1,571
2	Austin Energy	1,344
3	CPS Energy (City of San Antonio)	1,059
4	Los Angeles Department of Water & Power	969
5	Omaha Public Power District	413
6	Lincoln Electric System	404
7	Sacramento Municipal Utility District (SMUD)	387
8	Nebraska Public Power District	313
9	Lower Colorado River Authority	251
10	MSR Public Power Agency (Modesto, Silicon Valley, Redding)	250

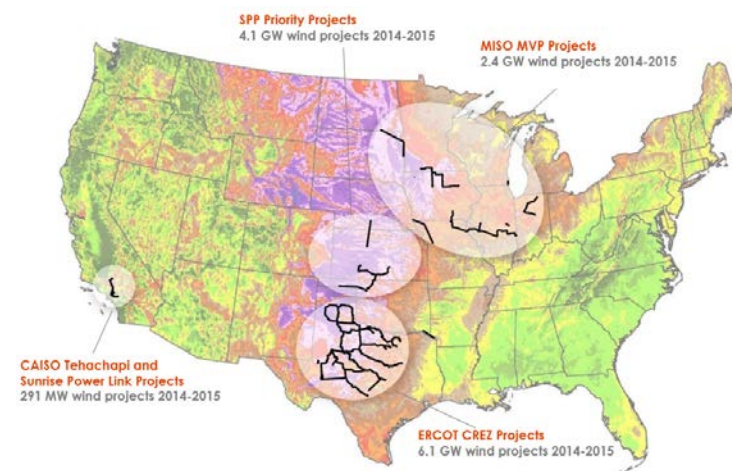


Non-utility wind energy purchasers in Nebraska

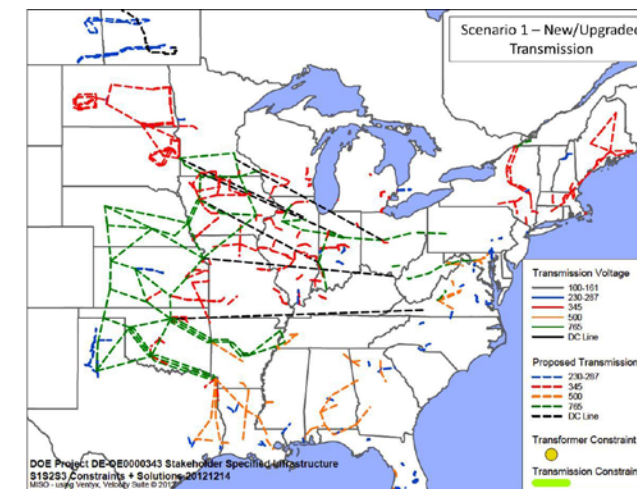
- F500 brands want wind
 - New Facebook data center in Nebraska to be powered by 200 MW of wind
- Nebraska cities are buying wind
 - Grand Island
 - Beatrice
 - Seward
 - South Sioux City
 - Wayne



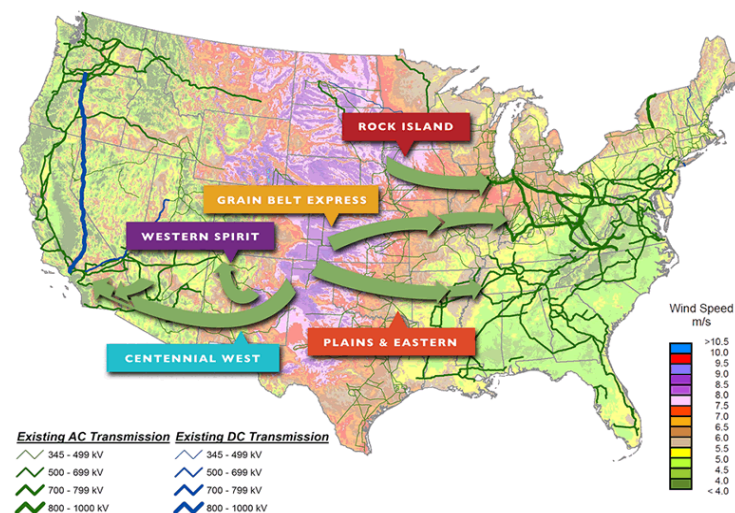
More transmission getting more low-cost wind to market



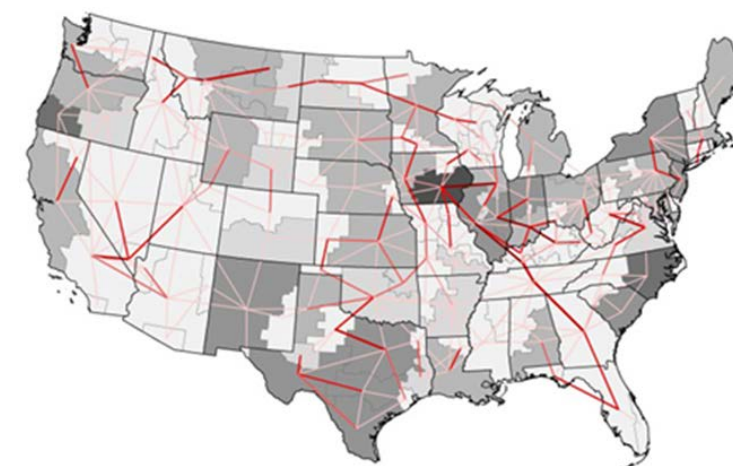
Regional grids: Benefits exceed costs many times over



Eastern Interconnect Planning Collaborative



High-voltage DC lines coming

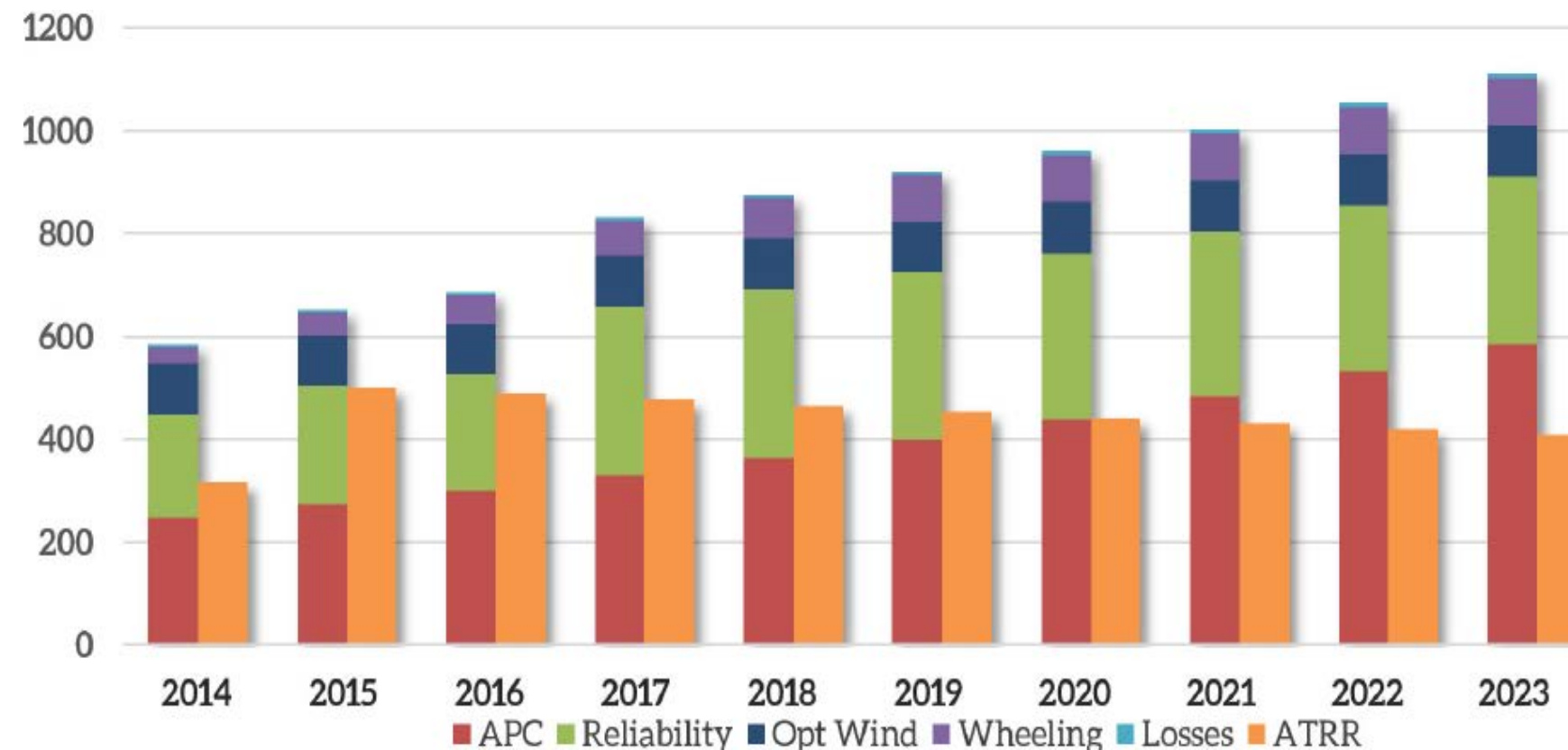


DOE WindVision 2050 case

Benefits of transmission exceed costs: SPP

2012-4 upgrades produced savings 3.5 times the cost

- Nearly \$12 billion in consumer benefits over 40 years, \$2,400 per customer



Benefits (left) exceed cost (right) of transmission upgrades

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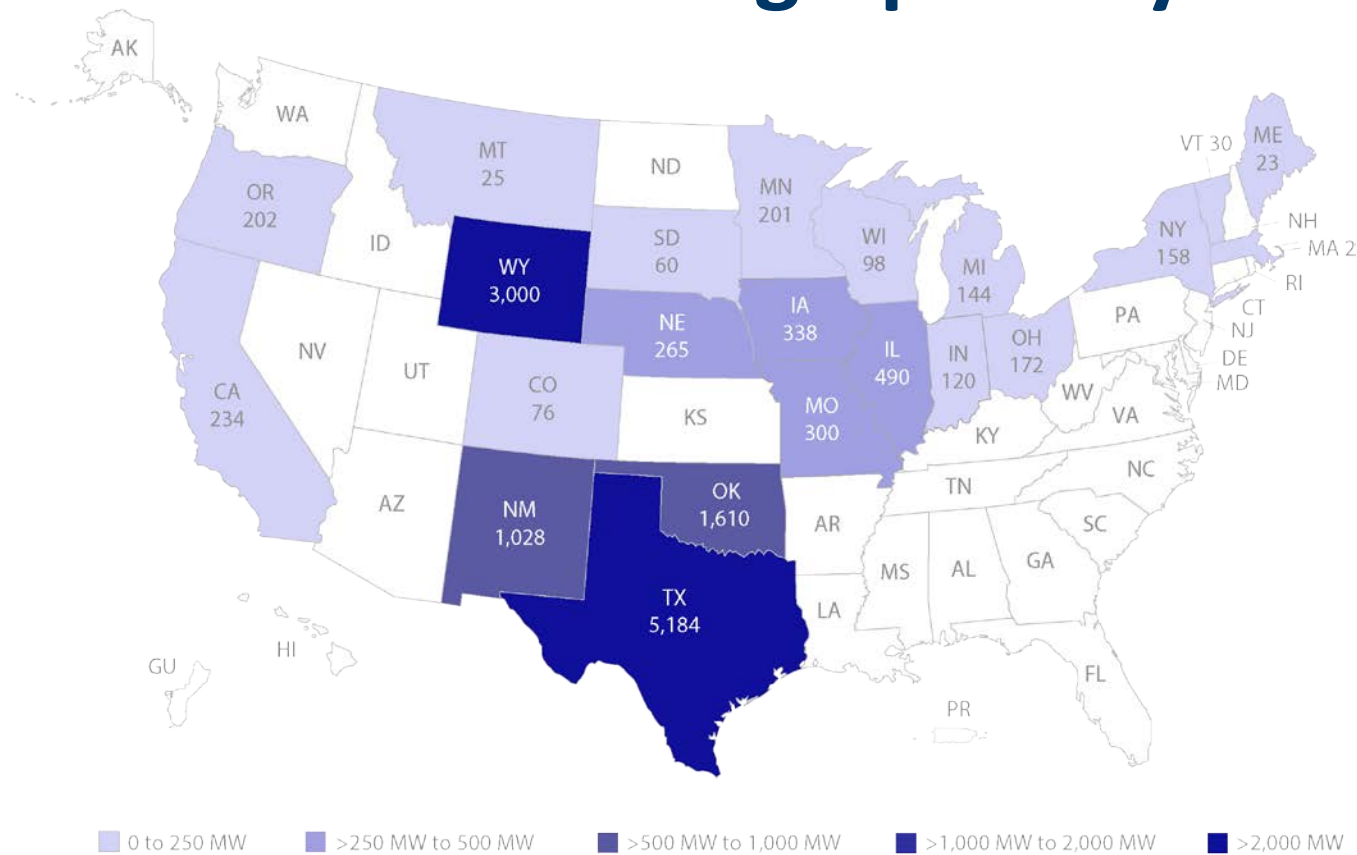




U.S. Wind Industry Third Quarter 2017 Market Report

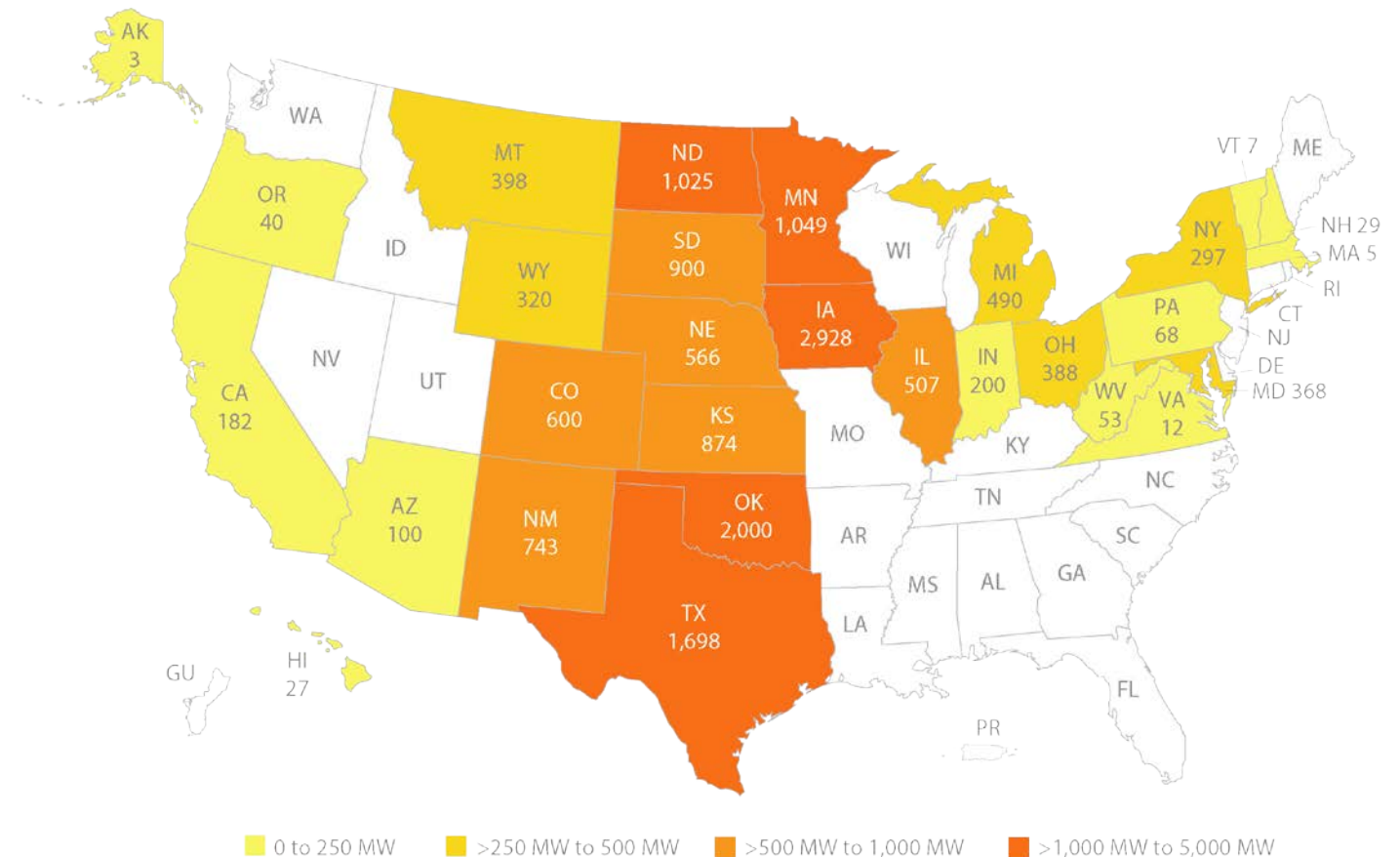


Geographically diverse wind project activity

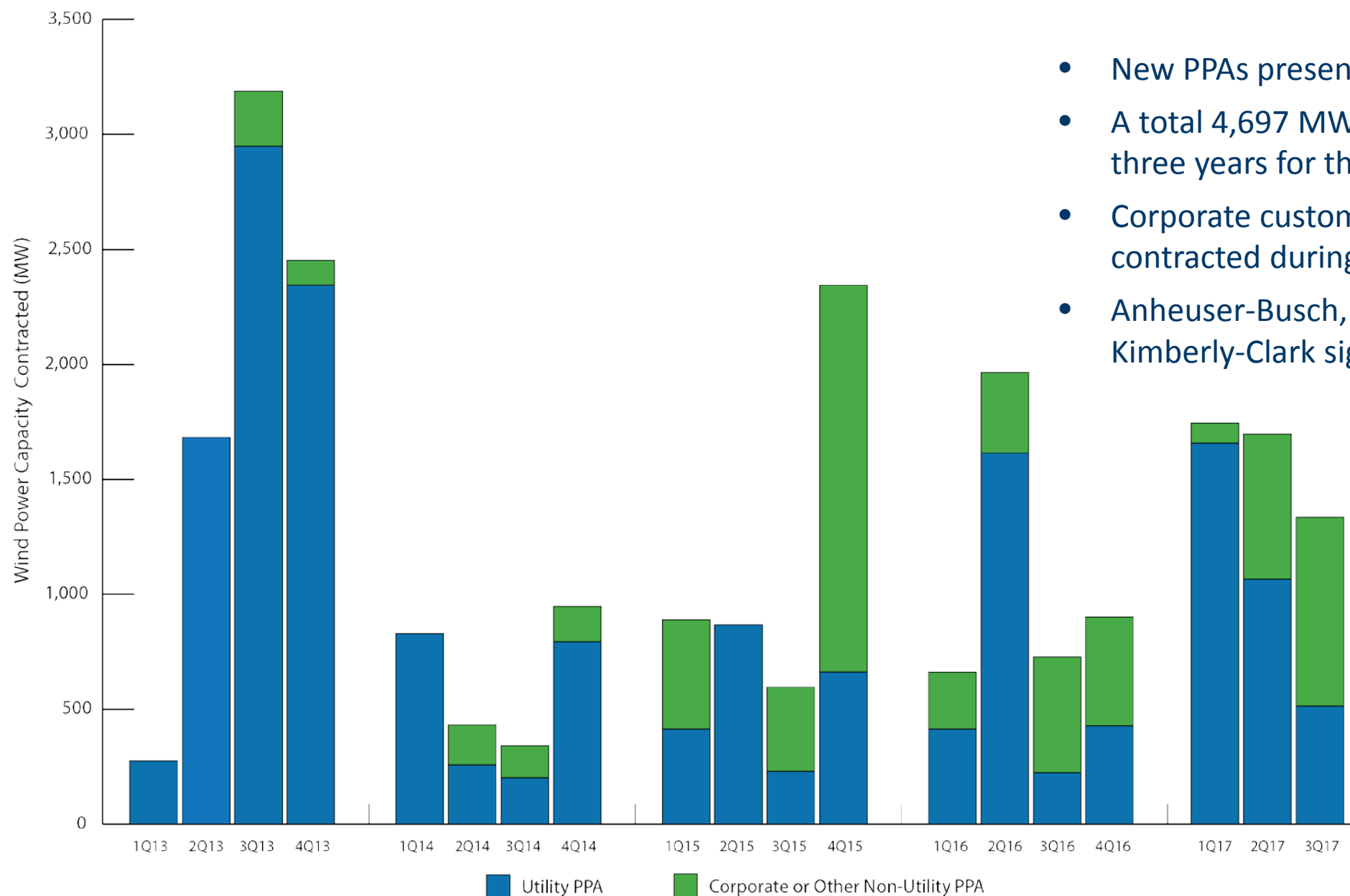


- 13,759 MW under construction spanning 70 projects in 22 states
- Texas leads regionally with 38% of construction activity, followed by 30% in the Mountain West, 14% in the Plains, and 13% in the Midwest

- 13 projects in 11 states entered advanced developed in 3Q
- Total activity includes 79 projects in 29 states adding up to 15,875 MW
- Midwest hosts 45% of activity – Plains states (22%), the Mountain West (11%), and Texas (11%) follow



Power purchaser activity



- New PPAs presenting 1,337 MW signed during 3Q
- A total 4,697 MW signed YTD, outpacing each of the last three years for the same time period
- Corporate customers represent 62% of project capacity contracted during 3Q
- Anheuser-Busch, Cummins, JPMorgan Chase, and Kimberly-Clark signed U.S. wind PPAs for the first time